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UNITED STATES DEPARTMENT OF COMMERCE

Patent and Trademark Office

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RG

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/401,660	09/23/99	NAKABAYASHI	M 684.2902

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EXAMINER	
CHANG, A	
ART UNIT	PAPER NUMBER

2872

DATE MAILED: 07/10/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/401,660

Applicant(s)
Nakabayashi et al

Examiner
Audrey Chang

Group Art Unit
2872

☒ Responsive to communication(s) filed on Sep. 23, 1999 and June 20, 2000

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-14 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-14 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 6, 7

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Remark

1. This Office Action is in response to applicant's preliminary amendments filed on September 23, 1999 and June 20, 2000 which have been entered as paper numbers 5 and 8.
2. By these amendments, claims 6, 9, 10 and 13-14 have been amended by the applicant. Claims 1-14 remain pending in this application.

Drawings

3. Figures 1A-1J, and 2A-2I should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "having plural diffraction grating surfaces accumulated" recited in claims 1-4, and 7-8 appears to be confusing and indefinite since it is not clear how do these diffraction surfaces "accumulated" and it is not clear where do these surface "accumulated"? The phrase "gratings surfaces are defined on material" recited in claims 1-4 and 7-8 appears to be inappropriate since the grating structure is formed on the material not defined on it. For the purpose of description, the examiner wishes to point out respectfully

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that a diffraction grating by nature and definition has surface relief structure such as protrusion and recess formed on the surface. The term “diffraction grating surface” is not the most correct term for describing a “diffraction grating having surface relief structure”.

The phrase “being formed into a kinoform, or a shape and a height of blazed or binary, close to it ...” recited in claims 1-4 and 7-8 appears to be vague, confusing and indefinite since it is not clear what exactly is the feature recited here. The applicant is respectfully reminded that a “kinoform” (which is a kind of a diffraction grating), “a shape”, “a height of blazed”, “a binary” and “close to it” are not equivalent elements to each other, and they therefore can not be presented together in an alternative expression since they do not share a common feature to make the scope of claim definite.

The term “the wavelength” recited in claims 1-4 and 7-8 appears to be vague and indefinite since it lacks proper antecedent basis from earlier part of the claims.

Regarding claims 3-4 and 5, the phrase “such as” renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

The phrase “a first diffraction grating and a recess and/or protrusion” and the phrase “a mold having a protrusion and/or a recess ... as well as a second diffraction grating pattern” recited in claim 11 appear to be vague and indefinite since it is not clear what is the structural relationship between the “diffraction grating” and the “recess and/or protrusion”. Claim 11 is incomplete since it omits essential method steps. It is not clear why would the diffractive optical element can be formed by positioning the first diffraction grating with the mold. The mold itself is obviously not a part of the diffractive optical element.

Claims 5-6, 9-10, 12 and 13-14 inherit the rejections from their respective based claims.

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Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

7. Claims 1-4, 7-8 and claims 6, 9 and 13-14 dependent therefrom are rejected under 35 U.S.C. 102(e) as being anticipated by the patent issued to Imamura et al (PN. 5,847,877).

Imamura et al teaches a diffractive optical element having a plurality of grating surface structures (21 and/or 22) that are formed at interfaces of different materials having different refractive indices and different dispersions wherein the protrusions and recess of the diffraction structure are engaged to each other between a pair of layers of the materials, (please see Figures 11-15). Imamura et al teaches that the grating structure may assume the shapes of triangular, sawtooth or blazed. Imamura et al also teaches that the depth of the grating structure may be set to equal the value to obtain 100 percent diffraction efficiency for an m_0 order for a selected wavelength, (please see columns 4 and 7), and when such depth is set for the grating structure the maximum optical path length difference is equal to an integer multiple of the selected wavelength. With regard to claim 9, the Imamura et al reference does not teach explicitly about the method for manufacturing the diffractive optical element includes the step of fitting the protrusions and recess however such step must be inherently included since the produced diffractive optical element has such fitted protrusions and recess. With regard to claims 13 and 14, Imamura et al teaches that the diffractive optical element may have the function of a lens which is an optical system. This reference therefore anticipated the claims.

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Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Imamura et al.

The diffractive optical element taught by Imamura et al as described for claims 1-4 and 7-8 above has met all the limitations of the claim with the exception that this reference does not teach explicitly that the plurality of diffraction gratings are disposed with an air gap. However such modification would have been obvious to one skilled in the art since the essential criterion for making the diffractive optical element is to form grating structures at interfaces of different optical material and air is an commonly known "optical material" used in the art as grating layers, as taught by Imamura et al in column 4, it would therefore have been an obvious modification to one skilled in the art to use an air gap as an alternative layer material for making the diffractive optical element for the benefit of designing the element with difference diffraction characteristics.

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Imamura et al in view of the patent issued to Tomono (PN. 5,629,804).

The diffractive optical element taught by Imamura et al as described for claims 1-4 and 7-8 above has met all the limitations of the claim with the exception that this reference does not teach explicitly that the diffraction grating structures are formed by using a mold. However using a mold to form diffraction grating

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structure is a very common practice in the art as demonstrated by the teaching of the Tomono wherein a mold (3) having the desired grating pattern, ie the protrusions and recess, is pressed on the resin layer (12) to form the grating structure in the layer, (please see Figures 6-8). It would therefore have been an obvious modification to one skilled in the art to apply the teachings of Tomono to manufacture the diffractive optical element of Imamura et al since such method is well known in the art. It would also have been an obvious modification for one skilled in the art to make the mold conforms with the first grating structure on the substrate in order to form the second diffractive grating disclosed by Imamura et al since it requires only routine skill in the art.

11. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Imamura et al in view of the patent issued to Tomono.

Imamura et al teaches a diffractive optical element having a plurality of diffraction grating structures formed at the interfaces of different grating layers with the protrusions and the recess of each pair of the grating layers engaged with each other, (please see Figures 11-15). The diffractive optical element is inherently made by a grating manufacture process. However this reference does not teach explicitly that the process includes using a mold. But using a mold to make a diffraction grating is rather an well known practice in the art as demonstrated by the teaching of the Tomono wherein a mold (3) having the desired grating pattern, ie the protrusions and recess, is pressed on the resin layer (12) to form the desired grating structure in the layer upon a substrate layer, (please see Figures 6-8). It would therefore have been an obvious modification to one skilled in the art to apply the teachings of Tomono to manufacture the diffractive optical element of Imamura et al since such method is well known in the art. It would also have been an obvious modification for one skilled in the art to make a mold conforms with the first grating structure on the

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substrate in order to form the second diffractive grating disclosed by Imamura et al on top of the first grating structure since it requires only routine skill in the art.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent issued to Cohn (PN. 5,117,306) teaches a diffractive lens having plurality of grating structures that are interposed by an air gap.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Chang whose telephone number is (703) 305-6208.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Papers related to this application may be submitted to Group 2800 through facsimile transmission. Papers should be faxed to Group 2800 via PTO Fax Center (fax number 703-308-7722) located in Crystal Plaza 4.



A. Chang (Primary Examiner)

July 7, 2000